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Lin et al.

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(54) **ONE-PIECE OPTICAL FIBER ADAPTER**

(71) Applicants: **Sung-An Lin**, Miaoli County (TW); **Sung-Chi Lin**, Miaoli County (TW)

(72) Inventors: **Sung-An Lin**, Miaoli County (TW); **Sung-Chi Lin**, Miaoli County (TW)

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G02B 6/38 (2006.01)

(52) **U.S. Cl.**
CPC ***G02B 6/3807*** (2013.01)

(58) **Field of Classification Search**
CPC G02B 6/3807
USPC 385/75
See application file for complete search history.

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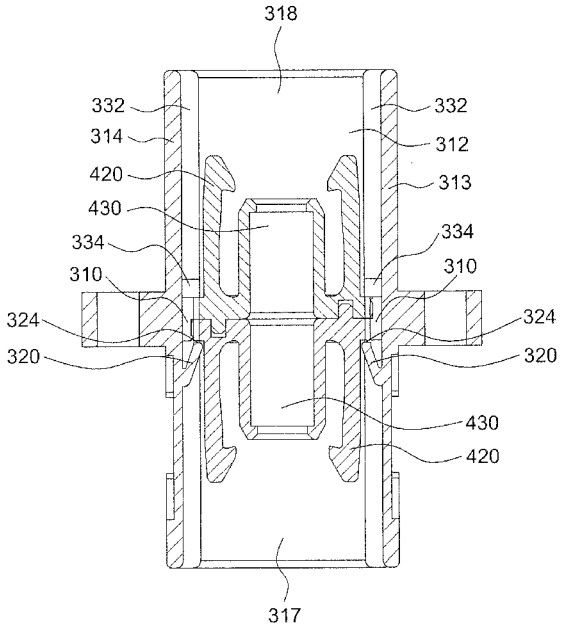
Primary Examiner — Sung Pak

(74) *Attorney, Agent, or Firm* — Rosenberg, Klein & Lee

(57) **ABSTRACT**

The optical fiber adapter of the present disclosure includes a main body and a pair of inner housings. The main body has a passage defined by a first wall, a second wall, a third wall and a fourth wall. The passage has opposing first and second openings in an axial direction. A first stop block is positioned on the first wall. A second stop block is positioned on the third wall. A first elastic plate and a second elastic plate are positioned within the passage. The inner housings are positioned within the passage, wherein the inner housing includes a flange and a hollow cylinder extending from the flange. The flanges of the two inner housings are attached to each other and are positioned between the first stop block and first elastic plate, and between the second stop block and second elastic plate.

14 Claims, 13 Drawing Sheets



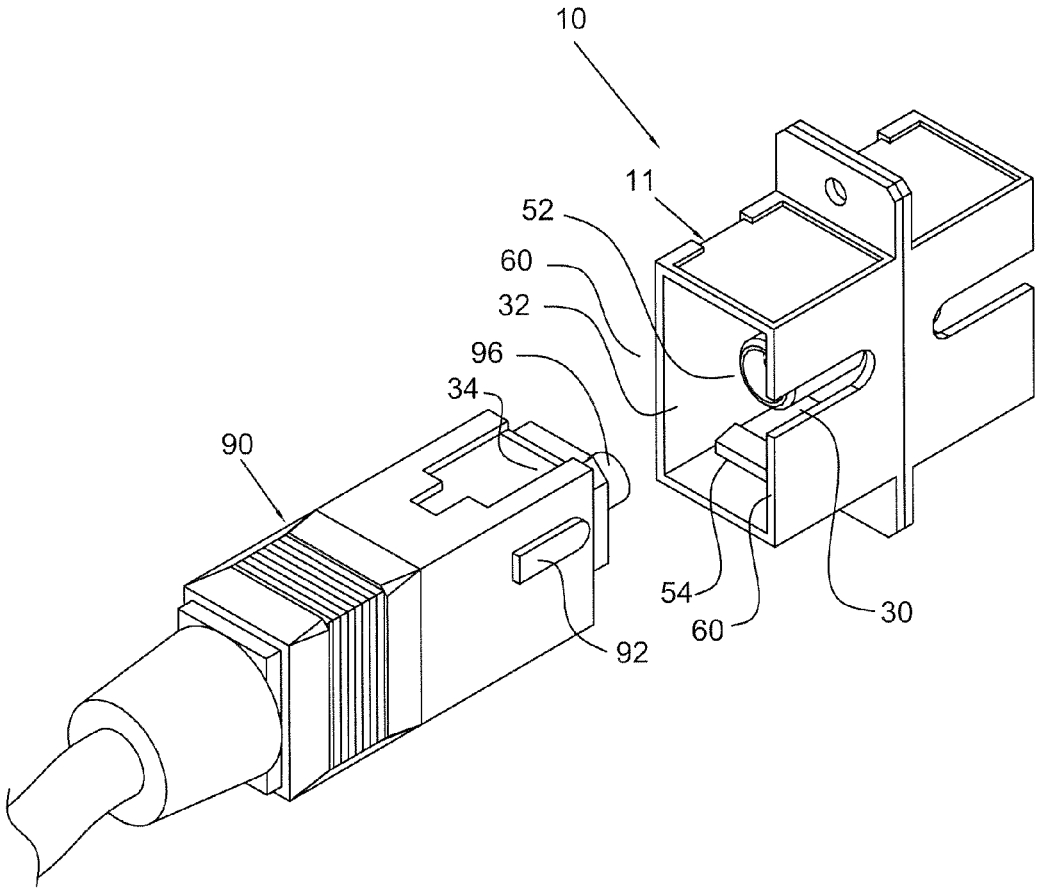


FIG.1 (PRIOR ART)

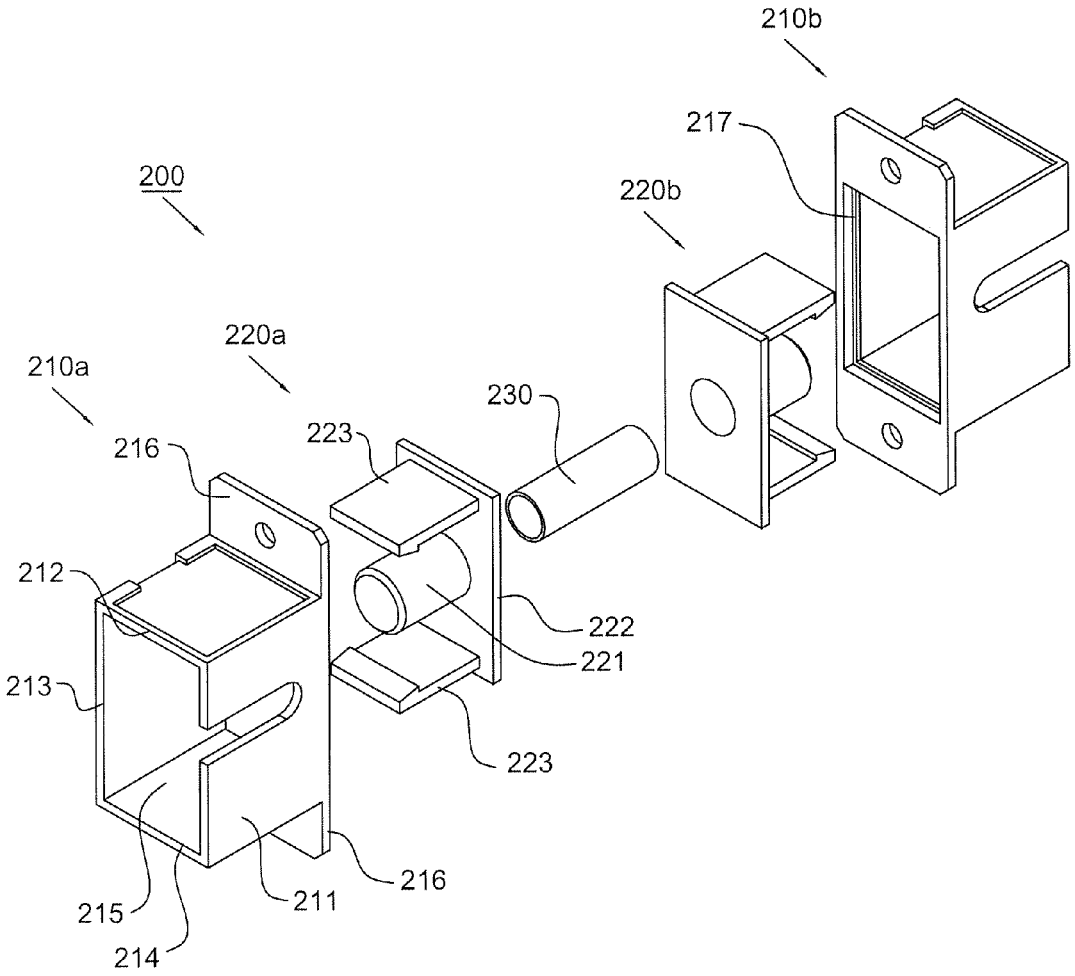


FIG. 2 (PRIOR ART)

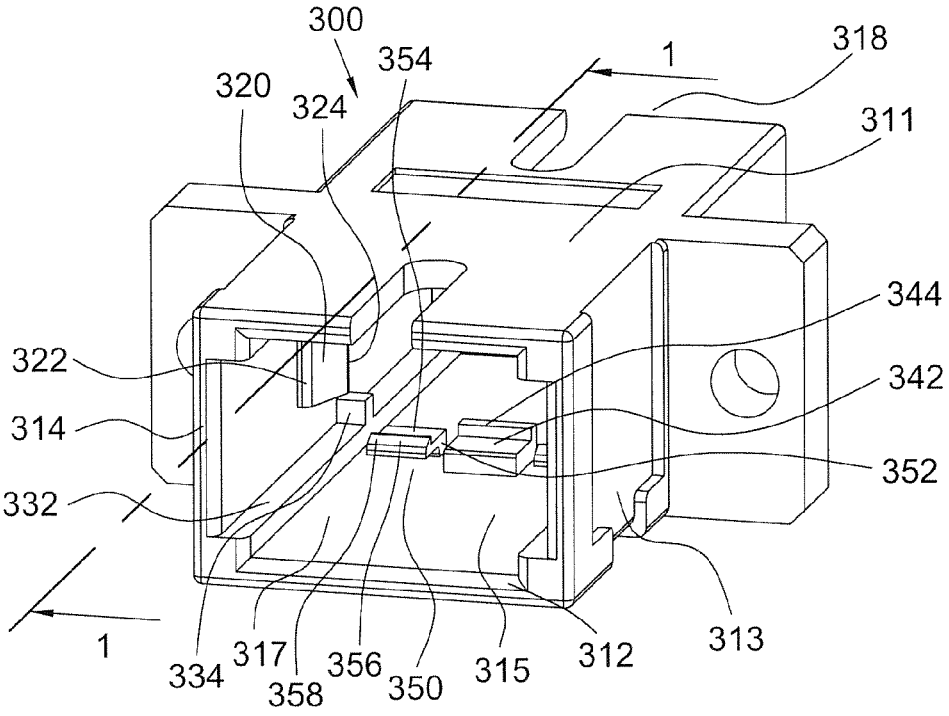
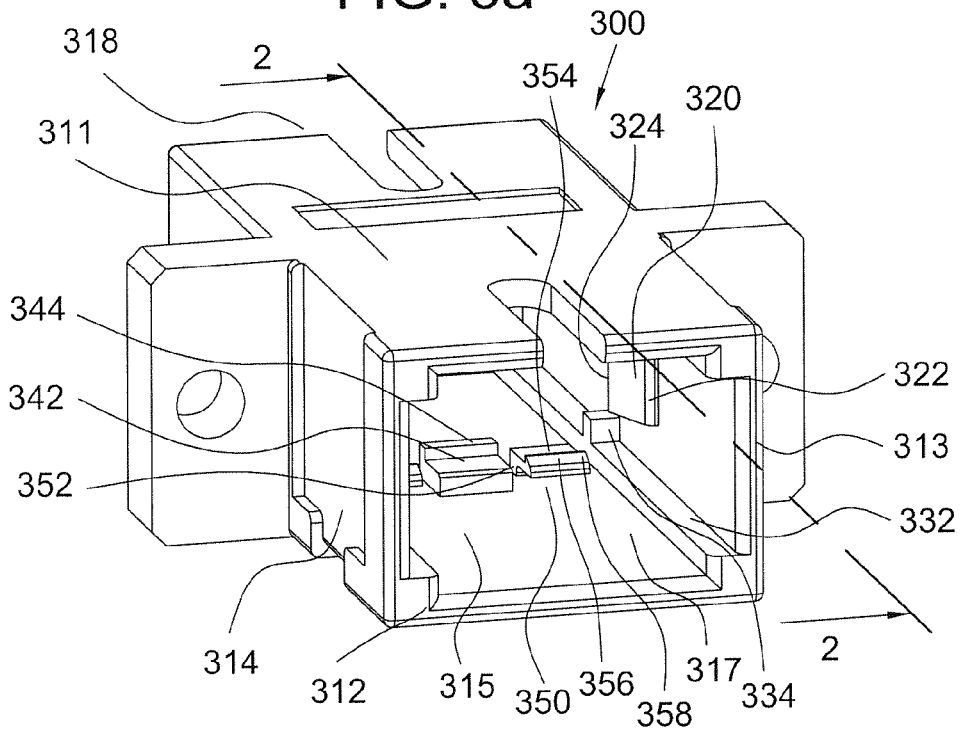

300
354
320
324
1
318
311
344
322
342
314
352
332
1
334
317
358
356
350
315
312
313

FIG. 3a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2
300
354
320
311
324
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332
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315
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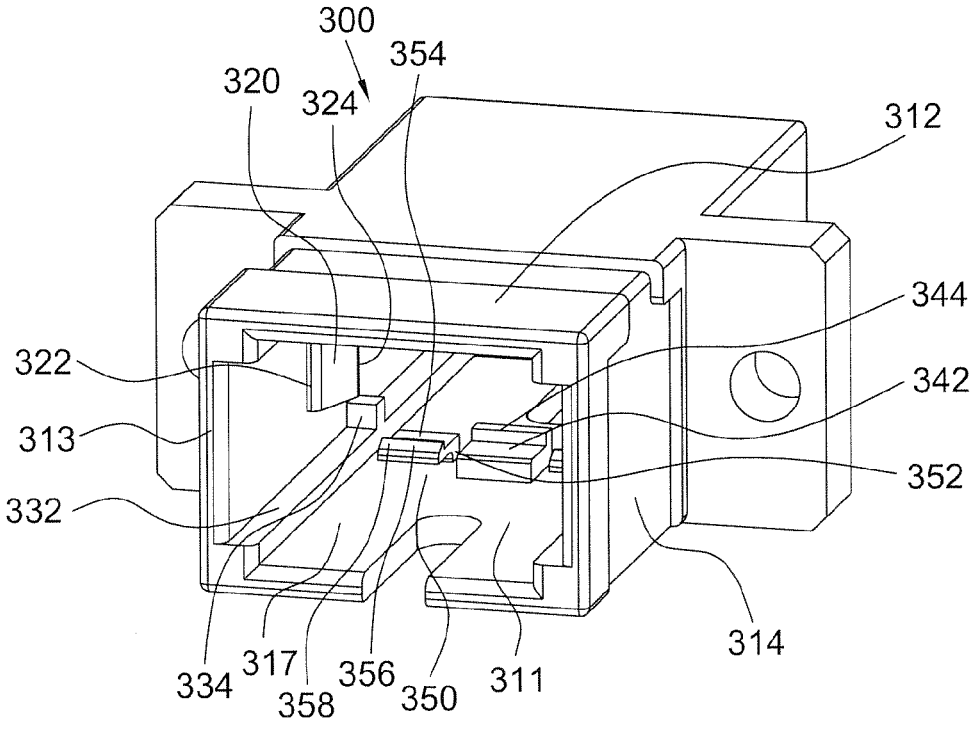
356
358
317
334
2

FIG. 3b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354
320
324
312
344
322
342
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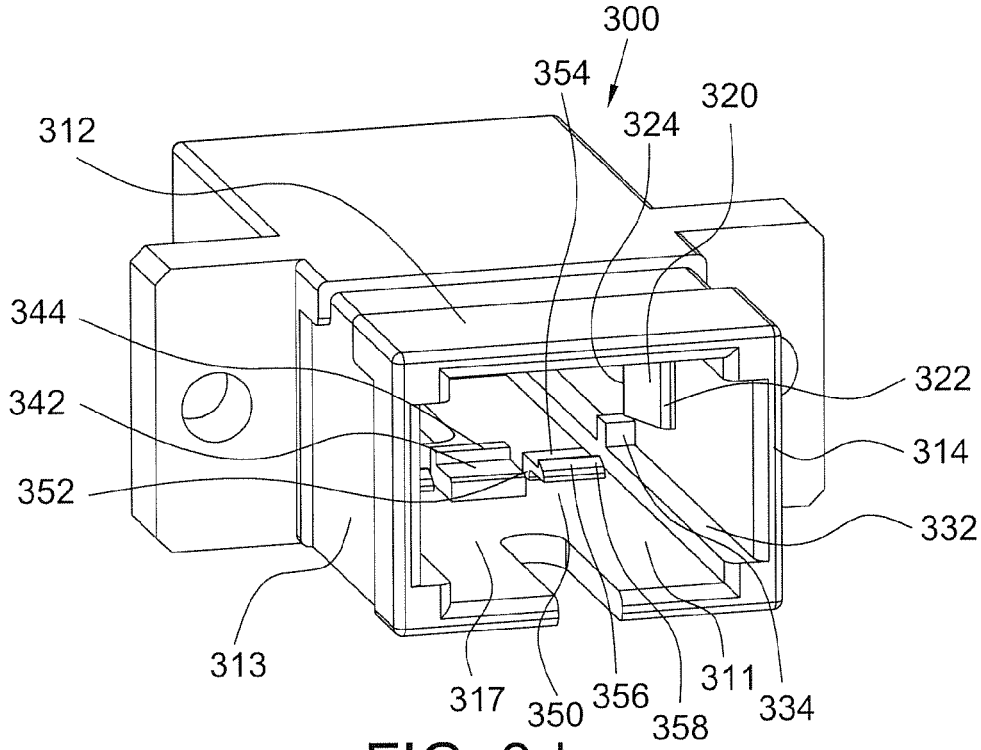
352
332
314
334
317
358
356
350
311

FIG. 3c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354
320
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344
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314
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317
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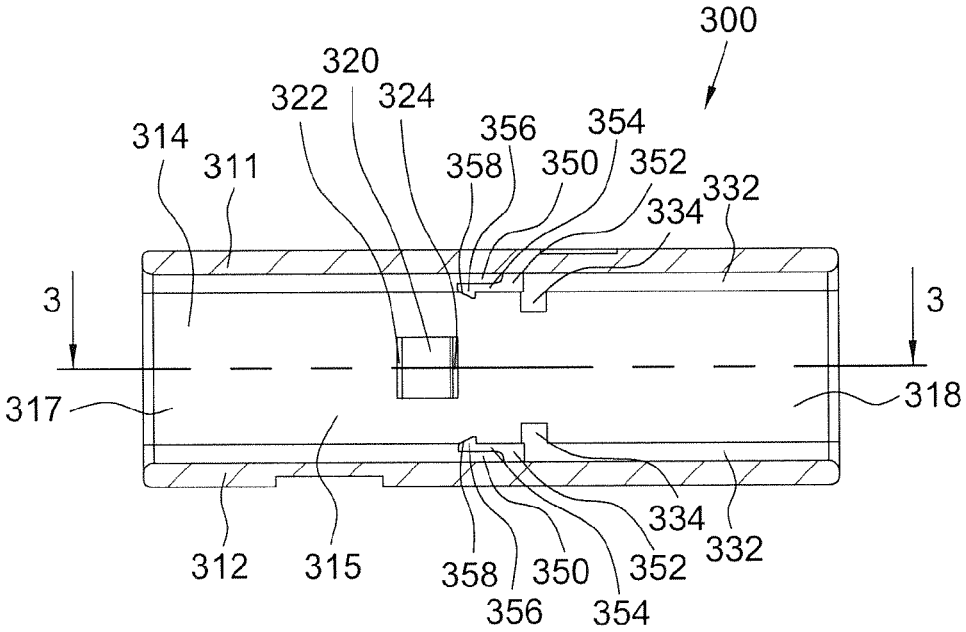
311
334

FIG. 3d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322
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314
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356
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358
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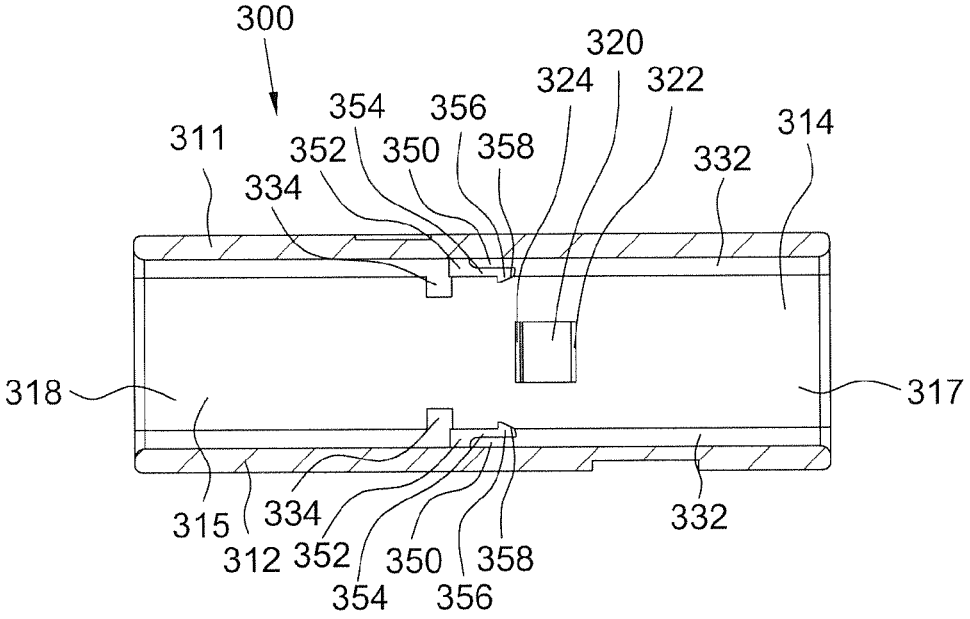
332
334
3
3
317
318
312
315
358
350
352
334
332
356
354

FIG. 3e


300
320
324
322
354
356
311
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332
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318
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332
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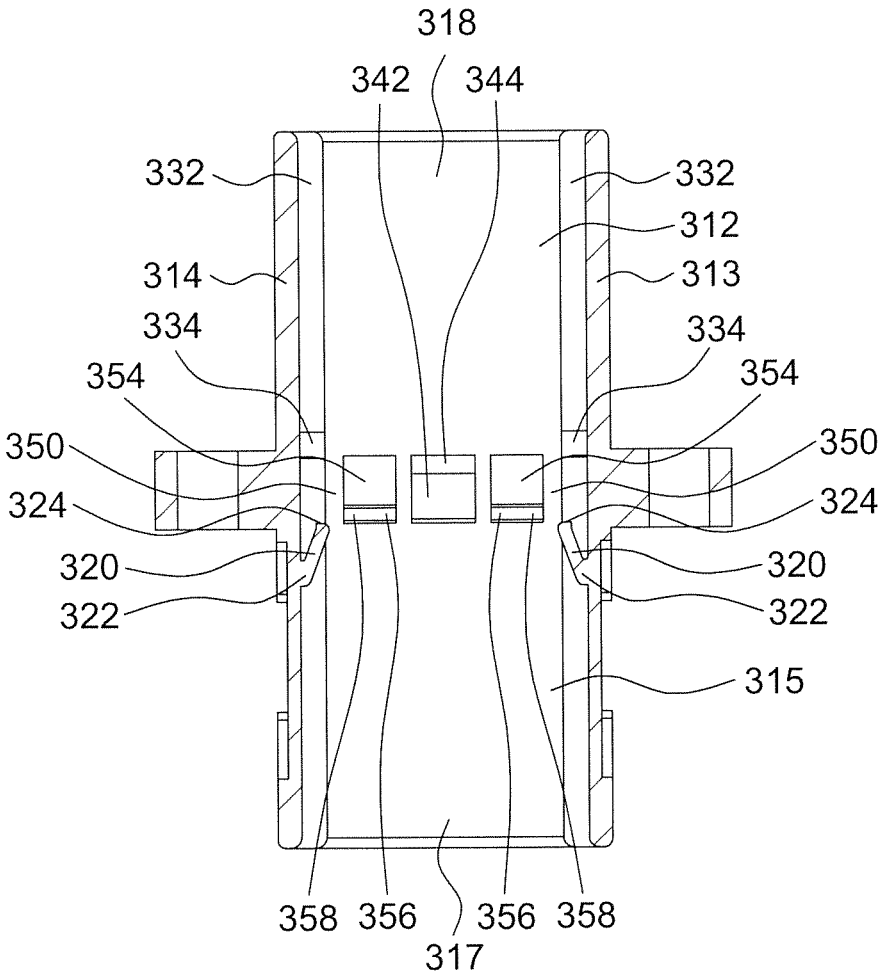
354
356

FIG. 3f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315
358
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358
317

FIG. 3g

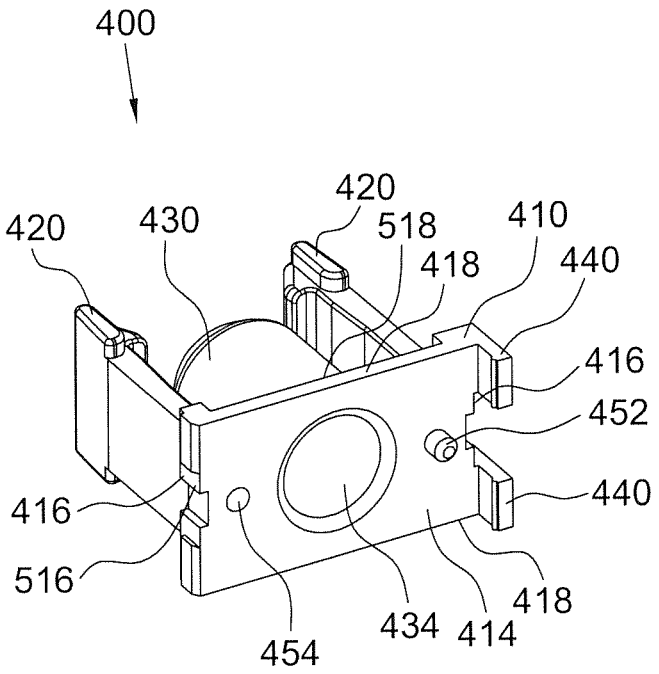

400
420
430
420
518
410
418
440
416
452
440
416
516
454
434
414
418

FIG. 4a

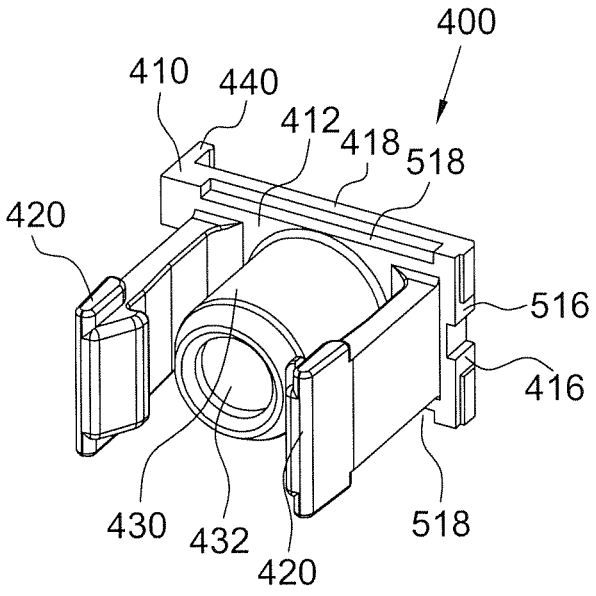

400
410
440
412
418
518
420
516
416
430
432
420
518

FIG. 4b

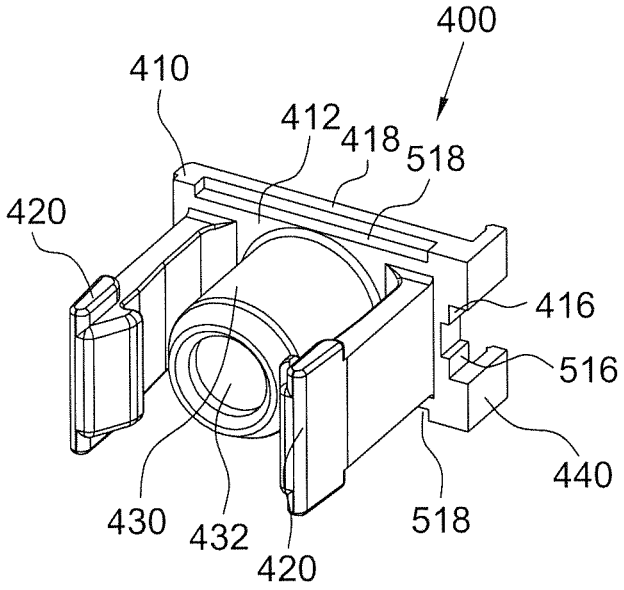


FIG. 4c

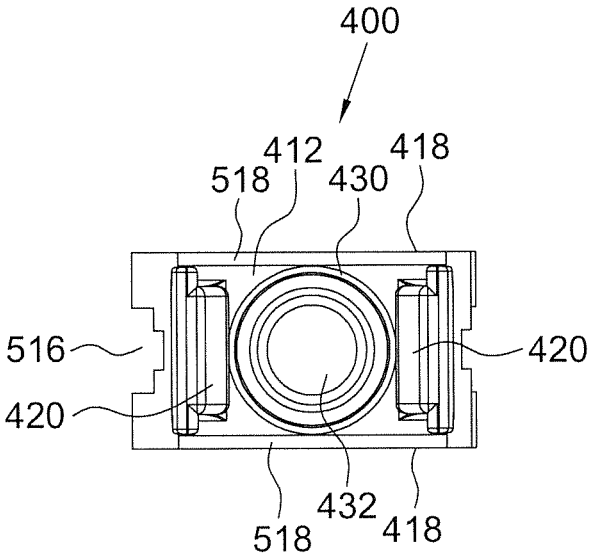

400
412
418
518
430
516
420
420
518
432
418

FIG. 4d

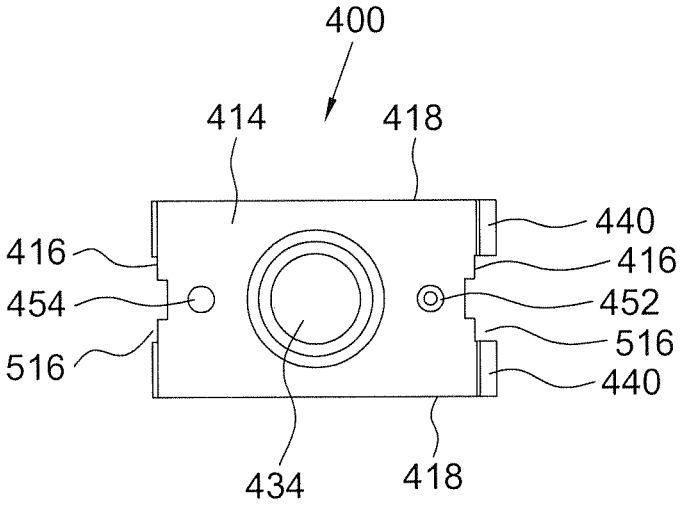
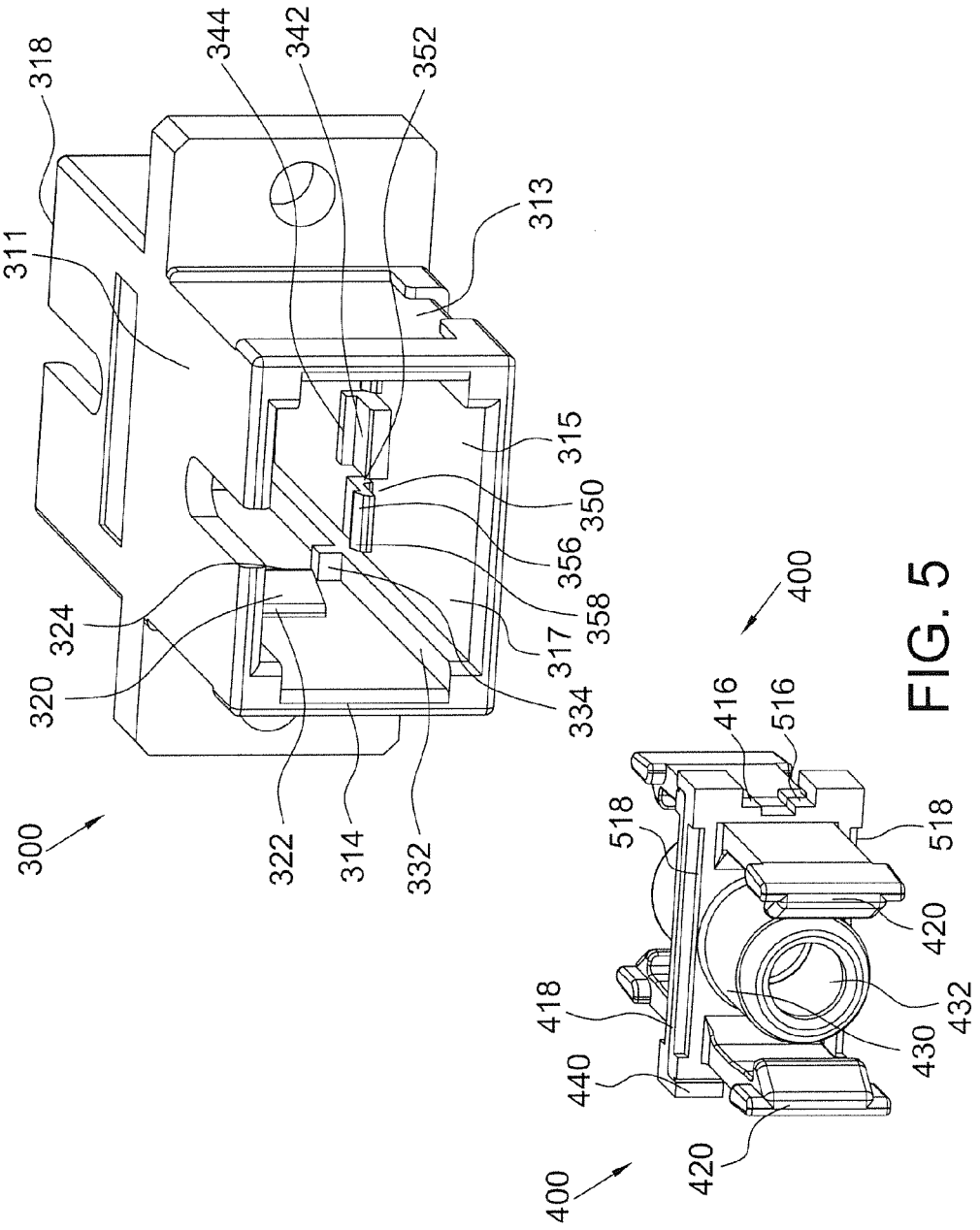

400
414
418
440
416
416
454
452
516
516
440
434
418

FIG. 4e


318
344
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311
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358
317
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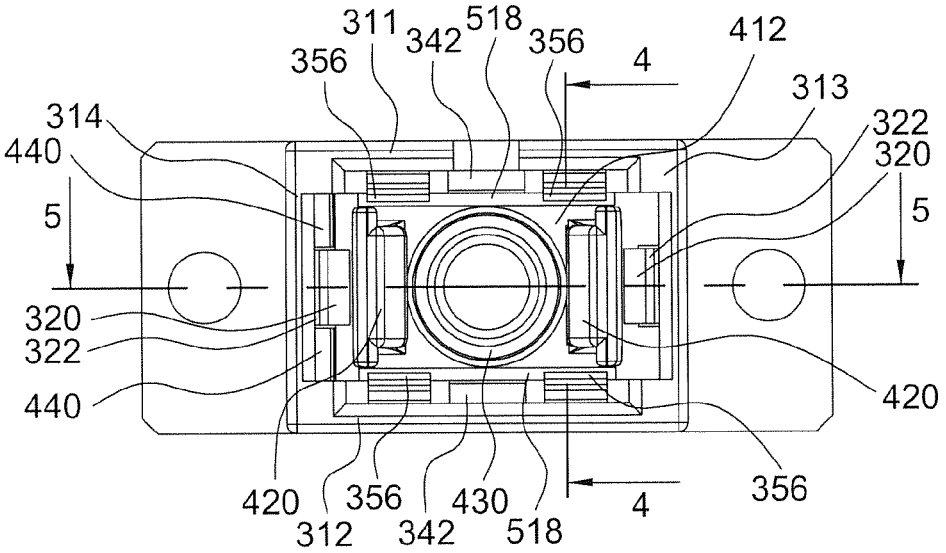
300
400
416
516
518
518
420
418
432
430
440
420
400

FIG. 5


311
342
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356
4
412
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314
322
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5
5
320
322
440
420
420
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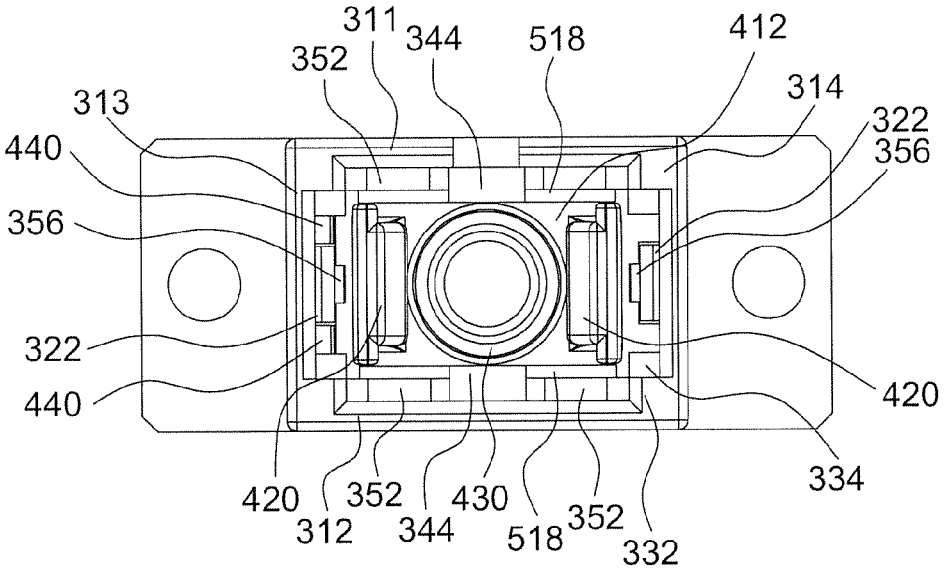
430
356
312
342
518
4

FIG. 6a


311
344
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412
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322
440
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430
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334
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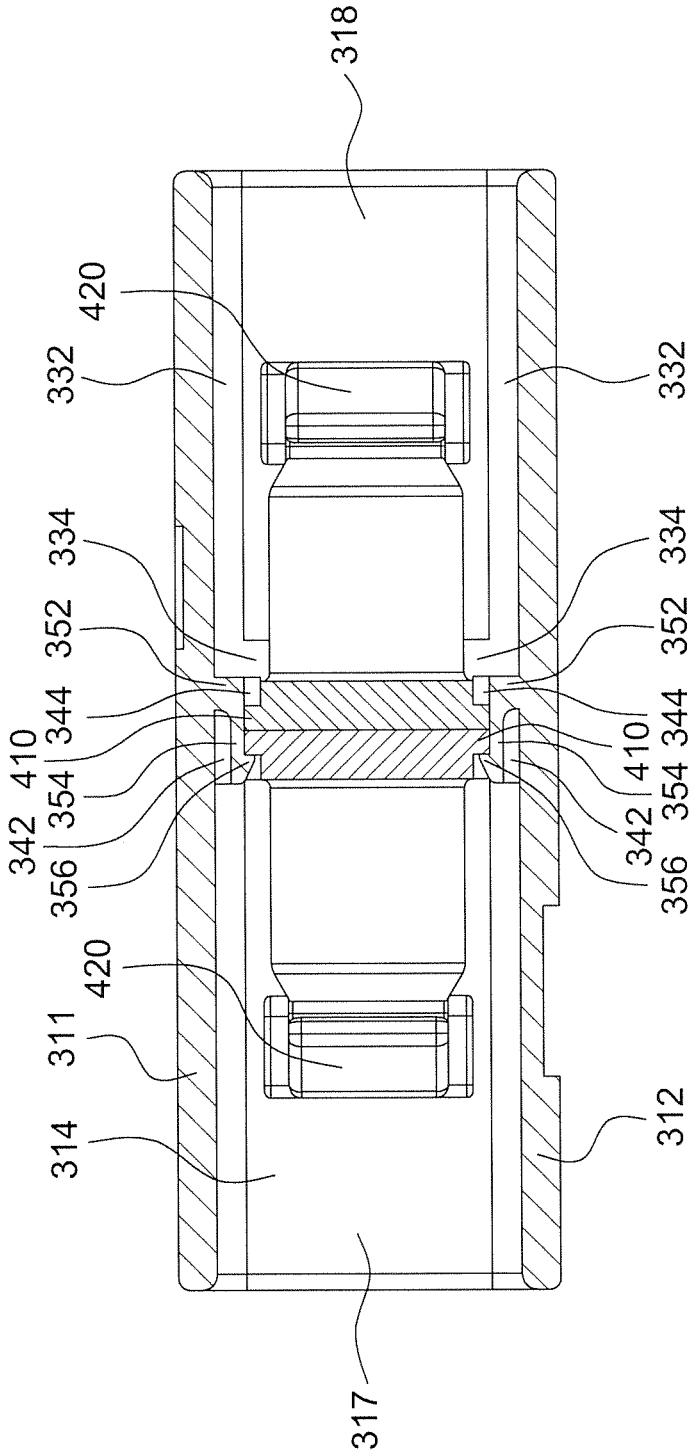
344
518
332

FIG. 6b


318
420
332
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410
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342
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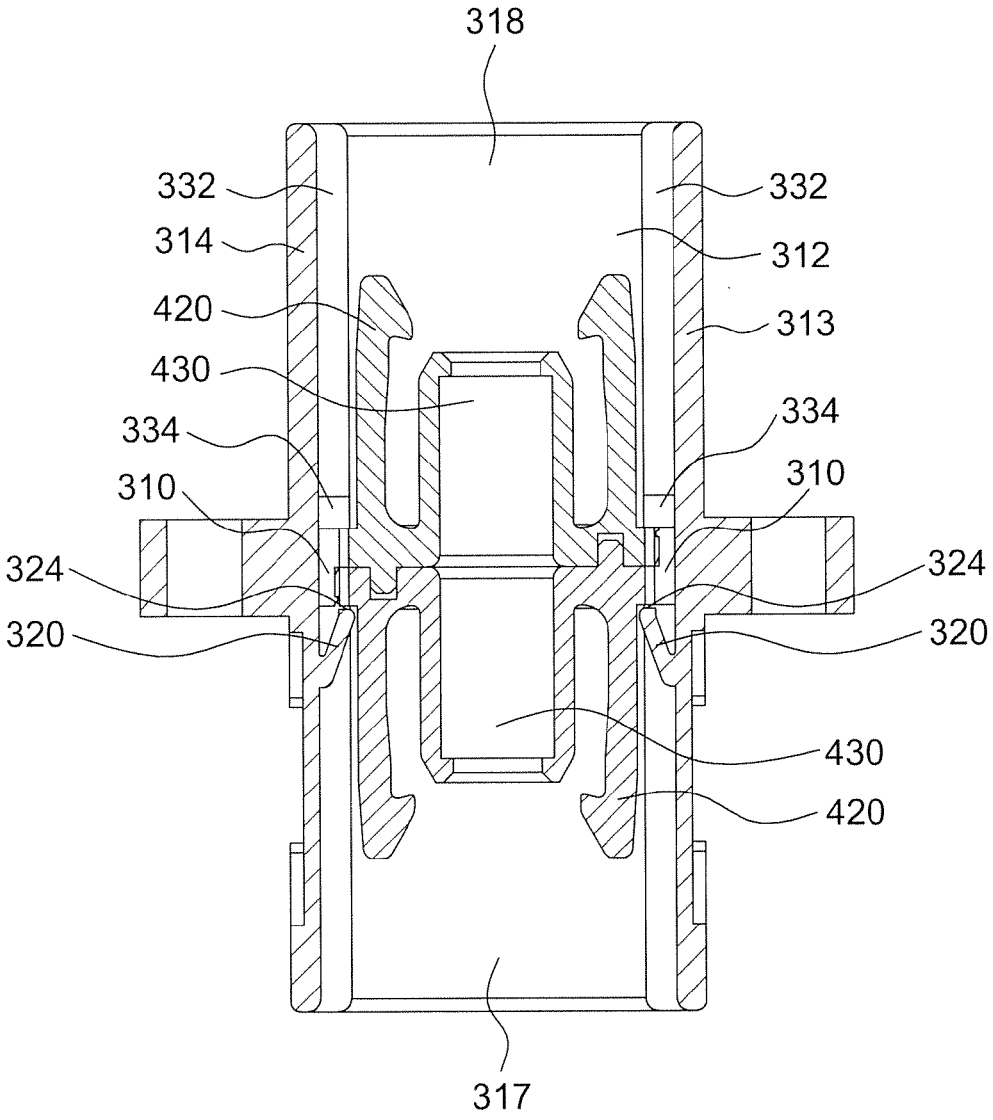
317

FIG. 7a


318
332
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334
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324
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332
312
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334
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324
320
430
420
317

FIG. 7b

ONE-PIECE OPTICAL FIBER ADAPTER

CROSS REFERENCE TO RELATED APPLICATION

The present application is based on and claims priority to Taiwanese Application Number 103100784, filed Jan. 9, 2014, the disclosure of which is hereby incorporated by reference herein in its entirety.

BACKGROUND

1. Technical Field

The disclosure relates to an optical fiber adapter, and more particularly, to a one-piece optical fiber adapter.

2. Description of the Related Art

Referring to FIG. **1**, a conventional SC type one-piece optical fiber adapter **10** includes a main body **11**. The main body **11** has an accommodation room **32** defined by a plurality of side-walls **60**, wherein the accommodation room **32** is configured to receive an optical fiber connector **90**. When the optical fiber connector **90** is inserted into the accommodation room **32** of the optical fiber adapter **10**, a key protrusion **92** on the connector **90** will be received in a guiding slot **30** on one side-wall **60**. In addition, the optical fiber adapter **10** further includes a sleeve **52** to receive a ferrule **96** of the connector **90** and a pair of hooks **54** to hook on to recesses **34** on the connector **90** when the connector **90** is mated with the adapter **10**.

Referring to FIG. **2**, a conventional optical fiber adapter **200** includes a first outer housing **210***a* and a second outer housing **210***b*, a first inner housing **220***a*, a second inner housing **220***b* and a sleeve **230**. The first outer housing **210***a* is identical to the second outer housing **210***b* in structure and the first inner housing **220***a* is identical to the second inner housing **220***b* in structure.

Each of the outer housings **210***a*, **210***b* has a rectangular accommodation room **215** defined by four side-walls **211**, **212**, **213**, **214**, wherein the accommodation room **215** is configured to receive the optical fiber connector **90**. A pair of tabs **216** is provided on the side-walls **212** and **214**, respectively so as to secure the adapter **200** on a panel. In addition, two elongated protrusions **217** are formed on the side-walls **211**, **213** of each the outer housings **210***a*, **210***b*, respectively, wherein the protrusions **217** are parallel to and separated for a predetermined distance from edges of the side-walls **211**, **213**, respectively. Each of the inner housings **220***a*, **220***b* is provided with a pair of hooks **223** extending from one surface of a generally rectangular flange **222**. The flange **222** includes a hollow cylinder **221** located between the two hooks **223**. The flange **222** is sized to be placed within the rectangular accommodation room **215** of the outer housing **210***a*, **210***b* and has a thickness equal to the predetermined distance from the protrusions **217** to the edges of the side-wall **211**, **213**.

The outer housings **210***a*, **210***b*, inner housings **220***a*, **220***b* and sleeve **230** may be assembled to form the optical fiber adapter **10** of FIG. **1**. The inner housings **220***a*, **220***b* are placed within the outer housings **210***a*, **210***b*, respectively and the sleeve **230** is inserted into the cylinders **221** of the inner housings **220***a* and **220***b*. Afterward, the tabs **216** of the outer housings **210***a* and **210***b* are bonded together by ultrasonic welding so that the outer housings **210***a* and **210***b* are attached to each other.

Since the tabs **216** are ultrasonically welded together, a welding line is present on the adapter **200**. Furthermore, the adapter **200** has more parts and therefore is time-consuming to assemble.

Accordingly, there exists a need to provide a solution to solve the aforesaid problems.

SUMMARY

The present disclosure provides an optical fiber adapter that has fewer parts and is simpler and easier to assemble.

In one embodiment, the optical fiber adapter of the present disclosure includes a main body and a pair of inner housings. The main body has a passage defined by a first wall, a second wall, a third wall and a fourth wall, wherein the first wall faces the third wall and connects with the second and fourth wall. The passage has opposing first and second openings in an axial direction to allow two optical fiber connectors to insert into the passage to mate with each other. A first stop block is positioned on the first wall. A second stop block is positioned on the third wall. A first elastic plate and a second elastic plate are positioned within the passage. The inner housings are positioned within the passage, wherein each of the inner housings includes a flange having opposing front and back surfaces and a hollow cylinder extending from the front surface. The flanges of the two inner housings are attached to each other and are positioned between the first stop block and first elastic plate, and between the second stop block and second elastic plate. The first, second stop blocks, and the first, second elastic plates are positioned to restrict a movement of the flanges in the axial direction. The first opening is further configured for the two inner housings to insert into the passage.

The present disclosure further provides a method of assembling the above optical fiber adapter.

The foregoing, as well as additional objects, features and advantages of the disclosure will be more readily apparent from the following detailed description, which proceeds with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is an elevated perspective view illustrating a conventional SC type optical fiber adapter and a conventional SC type optical fiber connector.

FIG. **2** is an exploded view of a conventional SC type optical fiber adapter.

FIGS. **3***a* to **3***d* are different perspective views of the main body of the optical fiber adapter of the present disclosure.

FIG. **3***e* is a cross-sectional view of the main body taken along line **1-1** in FIG. **3***a*.

FIG. **3***f* is a cross-sectional view of the main body taken along line **2-2** in FIG. **3***b*.

FIG. **3***g* is a cross-sectional view of the main body taken along line **3-3** in FIG. **3***e*.

FIGS. **4***a* to **4***c* are different perspective views of the inner housing of the optical fiber adapter of the present disclosure.

FIG. **4***d* is a front view of the inner housing of the optical fiber adapter of the present disclosure.

FIG. **4***e* is a rear view of the inner housing of the optical fiber adapter of the present disclosure.

FIG. **5** illustrates the combined inner housings and the main body according to the present disclosure.

FIG. **6***a* is a front view of the optical fiber adapter of the present disclosure.

FIG. **6***b* is a rear view of the optical fiber adapter of the present disclosure.

FIG. **7***a* is a cross-sectional view of the optical fiber adapter taken along line **4-4** in FIG. **6***a*.

FIG. 7*b* is a cross-sectional view of the optical fiber adapter taken along line **5-5** in FIG. **6***a*.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIGS. **3***a* to **3***g*, the optical fiber adapter according to the present disclosure includes a unitary molded plastic main body **300**. The main body **300** is substantially rectangular and has an passage **315** defined by a top wall **311**, a bottom wall **312**, a right wall **313** and a left wall **314**, wherein the top wall **311** faces the bottom wall **312** and connects with the right wall **313** and left wall **314**. The passage **315** has opposing first opening **317** and second opening **318** in an axial direction through which an optical fiber connector may be inserted into the passage **315**. Two elastic plates **320** are formed at the right wall **313** and left wall **314** respectively, wherein one extends from the right wall **313** toward the left wall **314** and the second opening **318**, and the other extends from the left wall **314** toward the right wall **313** and the second opening **318**. Specifically, the elastic plates **320** have roots **322** and rear ends **324**, respectively. One of the elastic plates **320** extends from the root **322** fixed at the right wall **313** to the rear end **324** located away from the right wall **313**. The other elastic plate **320** extends from the root **322** fixed at the left wall **314** to the rear end **324** located away from the left wall **314**. A rectangular supporting-portion **332** is formed at each of the respective intersections of the top wall **311**, bottom wall **312**, right wall **313** and left wall **314**. A stop block **334** is formed at each of the supporting portions **332**. A platform **342** is formed at each of the top wall **311** and bottom wall **312**. A rectangular stop-block **344** is formed at the each of the platforms **342**. Two elastic plates **350** are formed at the top wall **311** and positioned at opposing sides of the platform **342** formed at the top wall **311**, respectively. Two elastic plates **350** are formed at the bottom wall **312** and positioned at opposing sides of the platform **342** formed at the bottom wall **312**, respectively. The elastic plates **350** have roots **352**, arms **354** extending from the roots **352** toward the first opening **317**, and stop blocks **356** formed at rear ends of the arms **354**, respectively. The roots **352** are fixed at the top wall **311** and bottom wall **312**, respectively. The arms **354** are located away from the top wall **311** and bottom wall **312** and therefore clear gaps are formed between the arms **354** and the top and bottom walls **311**, **312**. The stop blocks **356** are generally triangular and have inclined planes **358** facing the first opening **317**.

Referring to FIGS. **4***a* to **4***e*, the optical fiber adapter of the present disclosure further includes a pair of inner housings **400**. The two inner housings **400** are identical to each other in structure and are configured to place within the passage **315**. Each of the inner housings **400** is provided with a generally rectangular flange **410** defined by a front surface **412**, a back surface **414** opposing to the front surface **412**, two longitudinal side-surfaces **416** and two transverse side-surfaces **418**, wherein the longitudinal side-surfaces **416** connect with the front surface **412**, back surface **414** and the transverse side-surfaces **418**. A pair of hooks **420** extends from the front surface **412** of the flange **410**. The flange **410** further includes a hollow cylinder **430** located between the two hooks **420**. The cylinder **430** has an opening **432**. Two indentations **518** proximate to the transverse side-surfaces **418** respectively are formed at the front surface **412** of the flange **410**. At least one hook **440** extends from one of the longitudinal side-surfaces **416**. An alignment pin **452** and a pin hole **454** are formed at the back surface **414** of the flange **410**. An opening **434** in communication with the hollow cylinder **430** is formed at the back surface **414** of the flange **410** and located between the alignment pin **452** and pin hole **454**. Furthermore, a breach **516** with a width slightly greater than that of the root **322** of the elastic plate **320** is formed in each of the longitudinal side-surfaces **416**.

Referring to FIG. **5**, when desiring to assemble the optical fiber adapter of the present disclosure, the two inner housings **400** are combined together by attaching the back surfaces **414** of the flanges **410** to each other in such a manner that the alignment pins **452** at the back surfaces **414** are inserted into the pin holes **454** at the opposing back surfaces **414** and the hooks **440** at the flanges **410** hook to the opposing flanges **410**. Afterward, the combined inner housings **400** are inserted into the passage **315** through the first opening **317** thereof. When the inner housings **400** continue to be pushed into the passage **315**, the transverse side-surfaces **418** of the flanges **410** of the inner housings **400** will slide on the supporting portions **332** and then confront the stop blocks **356** of the elastic plates **350**, respectively. The longitudinal side-surfaces **416** of the flanges **410** of the inner housings **400** will confront the elastic plates **320**, respectively. Since the elastic plates **350**, **320** may be depressed down, the transverse and longitudinal side-surfaces **418**, **416** of the flanges **410** of the inner housings **400** will press down the elastic plates **350**, **320** and slide on the inclined planes **358** of the stop blocks **356** and the elastic plates **320**, respectively.

Referring to FIGS. **6***a*, **6***b*, **7***a* and **7***b*, after the flanges **410** pass the stop blocks **356** and elastic plates **320**, the elastic plates **350**, **320** will move back to their original positions. If the inner housings **400** are tried to be further pushed toward the second opening **318**, the stop blocks **334**, **344** will then stop the flanges **410** from moving forward and the stop blocks **344** are received in the indentations **518** of the flange **410**. If the inner housings **400** are tried to be pulled out from the first opening **317**, the stop blocks **356** and elastic plates **320** will stop the flanges **410** from moving toward the first opening **317** thereby prevent the inner housings **400** from being pulled out of the passage **315** through the first opening **317**. Therefore, when the inner housings **400** are located in position in the passage **315**, the edges of the two flanges **410** will be positioned between the stop blocks **334**, **344** and the stop blocks **356**, elastic plates **320**. By this arrangement, the movement of the flanges **410** within the passage **315** in the axial direction will be restricted.

According to the optical fiber adapter of the present disclosure, the breaches **516** formed in the longitudinal side-surfaces **416** are sized to allow the passing of the roots **322** of the elastic plates **320** respectively when the inner housings **400** are inserted into the passage **315** of the main body **300**. Furthermore, the supporting portions **332**, arms **354** and platforms **342** are in contact with the flanges **410** to support the inner housings **400** when the inner housings **400** are located in position in the passage **315**.

According to the optical fiber adapter of the present disclosure, the main body **300** is integrally formed. Therefore, there is no welding line is present on the optical fiber adapter. Furthermore, the optical fiber adapter of the present disclosure has fewer parts and therefore is simpler and easier to assemble.

Although the present disclose has been explained in detailed with SC type optical fiber adapter, it will be appreciated that the optical fiber adapter of the present disclosure may include other types of adapters. For example, the optical fiber adapter of the present disclosure may be the LC type optical fiber adapter.

Although the preferred embodiments of the disclosure have been disclosed for illustrative purposes, those skilled in

the art will appreciate that various modifications, additions and substitutions are possible, without departing from the scope and spirit of the disclosure as disclosed in the accompanying claims.

What is claimed is:

1. An optical fiber adapter for optically coupling two optical fiber connectors with each other, the optical fiber adapter comprising:

a main body having a passage defined by a first wall, a second wall, a third wall and a fourth wall, the first wall facing the third wall and connecting with the second and fourth walls, wherein the passage has opposing first and second openings in an axial direction to allow the two optical fiber connectors to insert into the passage to mate with each other;

a first stop block positioned on the first wall;

a second stop block positioned on the third wall;

a first elastic plate positioned within the passage;

a second elastic plate positioned within the passage; and

a pair of inner housings positioned within the passage, each the inner housing comprising:

a flange having opposing front and back surfaces; and

a hollow cylinder extending from the front surface of the flange,

wherein the flanges of the two inner housings are attached to each other and are positioned between the first stop block and first elastic plate, and between the second stop block and second elastic plate, and

wherein the first, second stop blocks, and the first, second elastic plates are positioned to restrict a movement of the flanges in the axial direction,

wherein the first opening is further configured for the two inner housings to pass through the first opening to insert into the passage.

2. The optical fiber adapter as claimed in claim **1**, wherein the first elastic plate has a first root and a first rear end, the first root is fixed on the second wall, the first rear end is located away from the second wall, the first elastic plate extends from the first root toward the second opening of the passage to the first rear end.

3. The optical fiber adapter as claimed in claim **2**, wherein the second elastic plate has a second root and a second rear end, the second root is fixed on the fourth wall, the second rear end is located away from the fourth wall, the second elastic plate extends from the second root toward the second opening of the passage to the second rear end.

4. The optical fiber adapter as claimed in claim **1**, wherein the first elastic plate comprises:

a first root fixed on the first wall;

a first arm extending from the first root toward the first opening of the passage, wherein the first arm is located away from the first wall; and

a third stop block positioned on the first arm, wherein the third stop block is configured to stop the flanges from moving toward the first opening of the passage.

5. The optical fiber adapter as claimed in claim **4**, wherein the second elastic plate comprises:

a second root fixed on the third wall;

a second arm extending from the second root toward the first opening of the passage, wherein the second arm is located away from the third wall; and

a fourth stop block positioned on the second arm, wherein the fourth stop block is configured to stop the flanges from moving toward the first opening of the passage.

6. The optical fiber adapter as claimed in claim **1**, wherein the main body is integrally formed.

7. The optical fiber adapter as claimed in claim **3**, wherein each of the flanges has two side surfaces connects with the front and back surfaces, a breach is formed at each of the side surfaces, the breaches are configured to allow the passing of the first and second roots, respectively.

8. The optical fiber adapter as claimed in claim **5**, wherein each of the third and fourth stop blocks has an inclined plane facing the first opening of the passage.

9. The optical fiber adapter as claimed in claim **1**, wherein each of the inner housings has a hook extending from the flange to hook on to the flange of the other inner housing.

10. A method of assembling an optical fiber adapter, comprising:

providing a main body having a passage defined by a first wall, a second wall, a third wall and a fourth wall, the first wall facing the third wall and connecting with the second and fourth walls, the passage having opposing first and second openings in an axial direction to allow the two optical fiber connectors to insert into the passage to mate with each other, wherein a first stop block is positioned on the first wall, a second stop block is positioned on the third wall, a first elastic plate and a second elastic plate are positioned within the passage;

providing a pair of inner housings, each of the inner housings has a hollow cylinder extending from a flange;

inserting the two inner housings into the passage of the main body through the first opening; and

positioning the flanges of the two inner housings between the first stop block and first elastic plate, and between the second stop block and second elastic plate.

11. The method as claimed in claim **10**, further comprising:

sliding the flanges of the two inner housings on the first and second elastic plates.

12. The method as claimed in claim **10**, wherein the first elastic plate has a first root and a first rear end, the first root is fixed on the second wall, the first rear end is located away from the second wall, the first elastic plate extends from the first root toward the second opening of the passage to the first rear end.

13. The method as claimed in claim **12**, wherein the second elastic plate has a second root and a second rear end, the second root is fixed on the fourth wall, the second rear end is located away from the fourth wall, the second elastic plate extends from the second root toward the second opening of the passage to the second rear end.

14. The method as claimed in claim **10**, wherein the first elastic plate includes a first root, a first arm and a third stop block, the first root is fixed on the first wall, the first arm extends from the first root toward the first opening of the passage, the first arm is located away from the first wall, the third stop block is positioned on the first arm, the method further comprising:

sliding the flanges of the two inner housings on an inclined plane of the third stop block.

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